

BUDINGER ET AL.  
Appl. No. 10/673,317

**AMENDMENTS TO THE CLAIMS:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method of cleaning surfaces and surface cracks on a metallic article, comprising the steps of:

- (a) disposing the article within a vacuum furnace;
- (b) heating the article within the vacuum furnace; and
- (c) repetitively cycling hydrogen gas and a vacuum within the furnace by supplying in each cycle a fresh supply of hydrogen gas within the furnace followed by removal of reaction products resulting from a reaction between hydrogen gas and surface contaminants on the article and substantially all residual hydrogen gas from within the furnace.

2. (Original) A method according to Claim 1 including evacuating the furnace to a vacuum pressure of about 50 microns or less.

3. (Original) A method according to Claim 1 including evacuating the furnace to a vacuum pressure of about 1 micron or less.

4. (Original) A method according to Claim 1 including providing the hydrogen gas within the furnace at a pressure within a range of about 500-10000 microns.

5. (Original) A method according to Claim 1 including providing the hydrogen gas within the furnace at a pressure within a range of about 6000-9000 microns.

6. (Original) A method according to Claim 4 including evacuating the furnace to a vacuum pressure of about 50 microns or less.

7. (Original) A method according to Claim 4 including evacuating the furnace to a vacuum pressure of about 1 micron or less.

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8. (Original) A method according to Claim 5 including evacuating the furnace to a vacuum pressure of about 50 microns or less.
9. (Original) A method according to Claim 5 including evacuating the furnace to a vacuum pressure of about 1 micron or less.
10. (Currently Amended) A method according to Claim 1 wherein step (b) includes heating the ~~component~~article within the furnace to a temperature of about 1400°F and wherein step (c) includes introducing the hydrogen gas in each cycle with the article maintained at a temperature of about 1400°F or above.
11. (Original) A method according to Claim 1 including, subsequent to step (c), (d) cooling the article under an inert gas.
12. (Original) A method according to Claim 11 including, subsequent to step (d), removing the cleaned article from the furnace and applying a filler of a molten metal to the surface cleaned by steps (a) (d).
13. (Original) A method according to Claim 1 including maintaining the hydrogen gas in each cycle for a time period of between about ten minutes and four hours.
14. (Original) A method according to Claim 1 including maintaining the hydrogen gas in each cycle for a time period of between about thirty minutes and sixty minutes.
15. (Currently Amended) A method of refurbishing surfaces on a turbine component formed of a cobalt based alloy wherein the surfaces include oxide contaminants, comprising the steps of:
- (a) disposing the turbine component within a vacuum furnace;
  - (b) heating the turbine component within the vacuum furnace;

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(c) repetitively cycling hydrogen gas and a vacuum within the furnace by supplying in each cycle a fresh supply of hydrogen gas within the furnace, followed by removal of reaction products resulting from a reaction between the hydrogen gas and surface oxides on the article and substantially all of any residual hydrogen gas from within the furnace; and

(d) adhering a molten metal to the cleaned surface of the turbine component subsequent to step (c) to refurbish the surface.

16. (Original) A method according to Claim 15 including providing the hydrogen gas within the furnace at a pressure within a range of about 6000 9000 microns and evacuating the furnace to a vacuum pressure of about 50 microns or less.

17. (Original) A method according to Claim 15 including providing the hydrogen gas within the furnace at a pressure within a range of about 6000 9000 microns and evacuating the furnace to a vacuum pressure of about 1 micron or less.

18. (Original) A method according to Claim 16 wherein the hydrogen gas pressure is maintained for a predetermined time and including heating the turbine component to a temperature of about 2200°F and maintaining the pressure of said temperature for said predetermined time.

19. (Currently Amended) A method of cleaning surfaces and surface cracks on a metallic article, comprising the steps of:

- (a) disposing the article in a vacuum furnace;
- (b) evacuating the furnace;
- (c) heating the ~~component~~ article in the vacuum furnace;
- (d) in a first cycle, introducing hydrogen gas into the furnace to obtain a partial pressure within the furnace;

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- (e) raising the temperature of the article within the furnace to a predetermined temperature during said first cycle;
  - (f) holding the predetermined temperature of the article within the furnace for a predetermined time period during said first cycle;
  - (g) evacuating the furnace during said first cycle;
  - (h) in a second cycle following said first cycle, reintroducing hydrogen gas into the furnace to obtain a partial pressure within the furnace;
  - (i) raising the temperature of the article within the furnace to a predetermined temperature during said second cycle;
  - (j) holding the predetermined temperature of the article within the furnace for a predetermined time period during the second cycle; and
  - (k) evacuating the furnace during the second cycle.
20. (Original) A method according to Claim 19 wherein steps (b) and (g) include evacuating the furnace to a vacuum level of about 1 micron or below.
21. (Original) A method according to Claim 19 wherein step (c) includes heating the article to about 1400°F.
22. (Original) A method according to Claim 21 wherein the hydrogen gas of step (d) is introduced into the furnace when the temperature of the article is about 1400°F.
23. (Original) A method according to Claim 19 wherein steps (e) and (i) include raising the temperature of the article within the furnace to about 1800°F or higher.
24. (Original) A method according to Claim 19 wherein steps (e) and (i) include raising the temperature of the article within the furnace to about 2200°F.

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25. (Original) A method according to Claim 19 wherein steps (f) and (j) include holding the predetermined temperature of the article within the furnace for a period of between .5 1 hour.

26. (Original) A method according to Claim 19 including, subsequent to step (k), cooling the article within the furnace under an inert gas.

27. (Original) A method according to Claim 19 wherein steps (a) through (k) are performed in sequence and, following step (k) and in a third cycle, reintroducing partial pressure hydrogen gas into the furnace, raising the temperature of the article within the furnace to a predetermined temperature, holding the predetermined temperature of the article within the furnace for a predetermined time period and evacuating the furnace.

28. (Original) A method according to Claim 19 wherein steps (b) and (g) include evacuating the furnace to a vacuum level of about 1 micron or below, step (c) includes heating the article to about 1400°F, steps (e) and (i) include raising the temperature of the article within the furnace to about 2200°F and steps (f) and (j) include holding the predetermined temperature of the article within the furnace for a period of at least about .5 1 hour.